

# **Kramer Electronics, Ltd.**



## **USER MANUAL**

### **Models:**

**VS-88A, VS-88V, SD-7588A, SD-7588V, RC-8000**

*88 Series*

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## 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in eight groups<sup>1</sup> that are clearly defined by function.

Congratulations on purchasing your Kramer *88 Series* switcher: **VS-88A**, **VS-88V**, **SD-7588A**, and/or **SD-7588V**, and/or **RC-8000** Remote Controller. These products are ideal for:

- Broadcast studios for on-air switching and signal routing
- Production studios, for connecting various sources to acceptors
- Non-linear editing suites and presentation applications

Each switcher package also includes the following items:

- Power cord
- Windows®-based Kramer control software<sup>2</sup>
- This user manual<sup>3</sup>

## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables<sup>4</sup>

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Downloadable from our Web site at <http://www.kramerelectronics.com>

3 Download up-to-date Kramer user manuals from the Internet at this URL: <http://www.kramerelectronics.com>

4 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

### 3 Overview

The *88 Series* is a group of 8x8 Vertical Interval Matrix Switchers<sup>1</sup> and a Remote Control Panel for video/stereo audio/data signals that support the simultaneous connection of one or more inputs to several outputs<sup>2</sup>. Vertical Interval Switching<sup>3</sup> ensures an undisturbed picture transition. The major innovation with the *88 Series* is the ability to switch different kinds of signals simultaneously. Section 3.1 outlines the *88 Series* and section 3.2 includes recommendations for achieving high quality performance.

#### 3.1 The 88 Series

The *88 Series* includes the following items:

- **VS-88A** (stereo audio matrix switcher for analog balanced audio)
- **VS-88V** (video matrix switcher for analog composite video)
- **SD-7588A** (audio matrix switcher for digital audio)
- **SD-7588V** (video matrix switcher for digital video)
- **RC-8000** (remote controller for use with the switchers)

#### 3.2 High Quality Performance Recommendations

Achieving high quality performance means:

- Connecting only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Using good quality sockets and connectors for the sources and acceptors to avoid signal path breaks<sup>4</sup>. Aim for Zero Ohm connection resistance and ensure that sockets and connectors match the required impedance (75 ohms in video)
- Avoiding interference from neighboring electrical appliances that may adversely influence signal quality. Install unbalanced audio and video lines<sup>5</sup> (even though the cables are shielded) away from mains carrying cables, electric motors, and transmitters

---

1 Switching is implemented during the vertical interval period according to the SMPTE RP-168 standard, when using synchronized SDI sources

2 However, you cannot connect two or more inputs to a single output

3 Frequently used when recording or transmitting a video program involving several video sources

4 Poor quality connectors tend to rust, which may cause breaks

5 Balanced audio lines are less prone to interference

- Positioning the switcher correctly. Each switcher is housed in a professional 19-inch rack mountable enclosure, requiring one vertical rack space per product<sup>1</sup>. The standard 19-inch (IU) EIA rack assembly requires no specific spacing above or below the unit for ventilation

## 4 Your Matrix Switchers

This section describes the products<sup>2</sup> in the *88 Series* range that can function separately<sup>3</sup> or switch together in the same manner in the *In System* mode<sup>4</sup>.

### 4.1 Your VS-88A 8x8 Balanced Audio Matrix Switcher

The **VS-88A** is a high performance 8x8 stereo audio matrix switcher for balanced audio stereo signals using detachable terminal block connectors. In addition, the **VS-88A**:

- Is a true matrix switcher, enabling the user to simultaneously route any input to any or all outputs
- Delivers excellent audio performance ensuring that it remains transparent in almost any audio application
- Is controllable via the front panel buttons as well as the built-in RS-232 and RS-485 interfaces
- Includes 15 preset memory locations for quickly and easily accessing the most frequently used configurations
- May be used with the **RC-8000**, an optional remote controller (see section 0)
- Functions as a standalone unit as well as part of a Kramer multi-signal switcher system<sup>5</sup>

Figure 1 and Table 1 define the **VS-88A**:

---

1 To install a switcher in a rack, see section 5

2 Switchers in the *88 Series* share identical front panel controls. Video switchers with the suffix V, have rear panel BNC connectors. Audio switchers with the suffix A, have rear panel detachable terminal block connectors

3 Standalone

4 Section 7 describes the different modes

5 Which includes digital and analog video, digital and analog audio and RS-422 control switchers. When integrated in a system, it switches together with the video during the vertical interval, thus supporting true IN SYSTEM mode

## Your Matrix Switchers

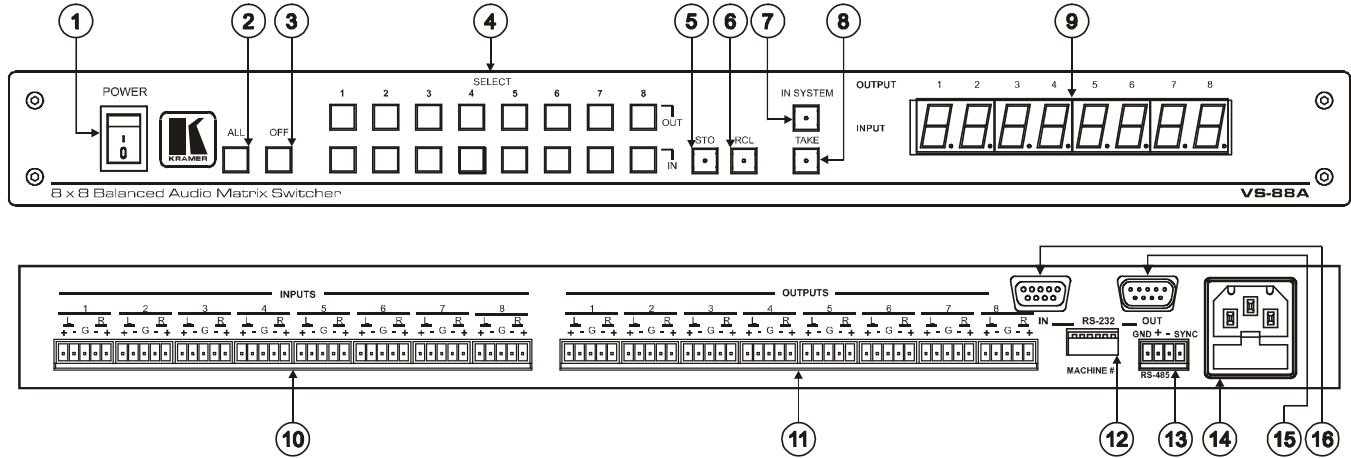


Figure 1: VS-88A 8x8 Balanced Audio Matrix Switcher

*Table 1: VS-88A 8x8 Balanced Audio Matrix Switcher Features*

#	Feature		Function
1	<b>POWER</b> Switch		Illuminated switch supplying power to the unit
2	<b>ALL</b> Button		Pressing <b>ALL</b> before pressing an <b>INP</b> button, connects that input to all outputs <sup>1</sup>
3	<b>OFF</b> Button		Pressing <b>OFF</b> after pressing an <b>OUT</b> button disconnects that output from the inputs. To turn off the connections, press the <b>ALL</b> button and then the <b>OFF</b> button
4	<b>SELECT</b> Buttons	<b>IN</b>	Select the output to which the input is switched (from 1 to 8)
		<b>OUT</b>	Select the input to switch to the output (from 1 to 8)
5	<b>STO</b> Button		Pressing <b>STO</b> (Store) followed by an output button stores the current setting (refer to section 8.2.1) <sup>2</sup>
6	<b>RCL</b> Button		Pressing the <b>RCL</b> (Recall) button and the corresponding <b>OUT</b> key recalls a setup. Press the <b>RCL</b> button again to implement the new status (refer to section 8.2.2)
7	<b>IN SYSTEM</b> Button		Pressing <b>IN SYSTEM</b> twice <sup>3</sup> , switches between the <i>Standalone</i> mode (in which the switcher implements any action independently from the others) and the <i>In System</i> mode (in which all switchers implement the same action simultaneously)
8	<b>TAKE</b> Button (TAKE = CONFIRM)		Pressing <b>TAKE</b> toggles the mode between the <b>CONFIRM</b> mode <sup>4</sup> and the <b>AT ONCE</b> mode (user confirmation per action is unnecessary)
9	<b>OUTPUT</b> labels		Identifies a connection between the output and the input shown below it
	<b>INPUT</b> Status Display		Displays the selected input switched to the output (marked above each input)
10	<b>INPUT</b> Terminal Block Connectors		Connect to balanced stereo audio sources (from 1 to 8)
11	<b>OUTPUT</b> Terminal Block Connectors		Connect to balanced stereo audio acceptors (from 1 to 8)
12	<b>MACHINE #</b>		Dipswitches setup (refer to section 6.1)
13	<b>RS-485</b> Connector		RS-485 detachable terminal block port. Pins # 1 to # 3 are for RS 485 and pin # 4 is for vertical sync distribution <sup>5</sup> as Figure 7 illustrates
14	Power Connector with Fuse		AC connector enabling power supply to the unit
15	<b>RS-232 OUT</b> 9-pin D-sub Connector		Connects to the RS-232 IN 9-pin D-sub port of the next unit in the daisy-chain connection <sup>6</sup>
16	<b>RS-232 IN</b> 9-pin D-sub Connector		Connects to PC or Remote Controller <sup>7</sup>

1 For example, press **ALL** and then Input button # 2 to connect input # 2 to all the outputs

2 For example, press **STO** and then the Output button # 3 to store in Setup # 3

3 After pressing **IN SYSTEM** once, it blinks

4 When in Confirm mode, the **TAKE** button illuminates

5 The 88 Series RS-485 connector has 4 pins, and the remote controller RS-485 connector has just 3 pins

6 If the unit is the final unit in the daisy-chain connection, no termination is required

7 If the unit is not the first unit in the line, connects to the RS-232 OUT 9-PIN D SUB port of the previous unit in the line



## 4.2 Your VS-88V 8x8 Video Matrix Switcher

The **VS-88V** is a high performance 8x8 composite video matrix switcher. In addition, the **VS-88V**:

- Is a true matrix switcher, enabling the user to simultaneously route any input to any or all outputs
- Supports more than 200MHz video bandwidth
- Switches during the vertical interval<sup>1</sup>
- Accepts analog video as the external source for its vertical interval trigger
- Is controllable via the front panel buttons as well as the built-in RS-232 and RS-485 interfaces
- Includes 15 preset memory locations for quickly and easily accessing the most frequently used configurations
- May be used with the **RC-8000**, an optional remote controller (see section 0)
- Functions as a standalone unit as well as part of a Kramer multi-signal switcher system<sup>2</sup>
- Can be combined as part of a group of **VS-88V** switchers that comprise a component switcher<sup>3</sup>

Figure 2 and Table 2 define the **VS-88V**:

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<sup>1</sup> Transitions are glitch-free when sources share a common reference sync

<sup>2</sup> Which includes digital and analog video, digital and analog audio, and RS-422 control switchers. When integrated into a system, it can provide the rest of switchers with the vertical interval trigger

<sup>3</sup> Refer to section 6.5 and Figure 9 on page 23

## Your Matrix Switchers

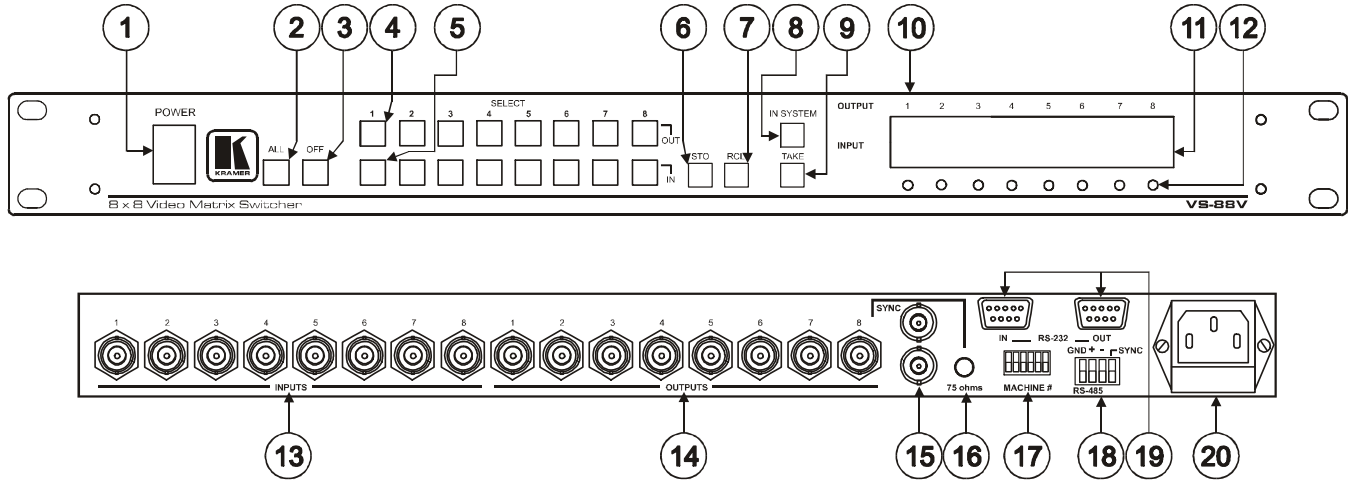


Figure 2: VS-88V 8x8 Video Matrix Switcher

## Your Matrix Switchers

*Table 2: VS-88V 8x8 Video Matrix Switcher Features*

#	Feature	Function
1	<b>POWER</b> Switch	Illuminated switch supplying power to the unit
2	<b>ALL</b> Button (ALL= All Outputs)	Pressing <b>ALL</b> before pressing an <b>INPUT</b> button, connects that input to all outputs <sup>1</sup>
3	<b>OFF</b> Button (OFF= All Inputs)	Pressing <b>OFF</b> after pressing an <b>OUTPUT</b> button disconnects that output from the inputs. To turn off the connections, press the <b>ALL</b> button and then the <b>OFF</b> button
4	<b>SELECT OUT</b> Buttons	Select the output to which the input is switched (from 1 to 8)
5	<b>SELECT IN</b> Buttons	Select the input to switch to the output (from 1 to 8)
6	<b>STO</b> Button	Pressing <b>STO</b> (STORE) followed by an output button stores the current setting (refer to section 8.2.1) <sup>2</sup>
7	<b>RCL</b> Button	Pressing the <b>RCL</b> (Recall) button and the corresponding <b>OUT</b> key recalls a setup. Press the <b>RCL</b> button again to implement the new status (refer to section 8.2.2)
8	<b>IN SYSTEM</b> Button	Pressing <b>IN SYSTEM</b> twice <sup>3</sup> , switches between the <i>Standalone</i> mode (in which the switcher implements any action independently from the others) and the <i>In System</i> mode (in which all switchers implement the same action simultaneously)
9	<b>TAKE</b> Button (TAKE = CONFIRM)	Pressing <b>TAKE</b> toggles the mode between the <b>CONFIRM</b> mode <sup>4</sup> and the <b>AT ONCE</b> mode (user confirmation per action is unnecessary)
10	<b>OUTPUT</b> labels	Identifies a connection between the output and the input shown below it
11	<b>INPUT</b> Status Display	Displays the selected input switched to the output (marked above each input)
12	Input Status LEDs	Illuminate when the input signal is presented on a corresponding line and complies with the SDI standard
13	<b>INPUTS</b> BNC Connectors	Connect to the video sources (from 1 to 8)
14	<b>OUTPUTS</b> BNC Connectors	Connect to the video outputs (from 1 to 8)
15	<b>SYNC</b> BNC Connectors	For looping to external video sync input
16	<b>75 ohms</b> Button	Controls loop termination <sup>5</sup>
17	<b>RS-232 IN</b> 9-pin D-sub Connector	Connects to PC or Remote Controller <sup>6</sup>
18	<b>MACHINE #</b> Dipswitches	For setup of the machine number (refer to section 6.1)
19	<b>RS-485</b> Connector	RS-485 detachable terminal block port. Pins # 1 to # 3 are for RS 485 and pin # 4 is for vertical sync distribution <sup>7</sup>
20	Power Connector with Fuse	AC connector enabling power supply to the unit
9	<b>RS-232 OUT</b> 9-pin D-sub Connector	Connects to the RS-232 IN 9-pin D-sub port of the next unit in the daisy-chain connection <sup>8</sup>

1 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

2 For example, press STO and then the Output button # 3 to store in Setup # 3

3 After pressing IN SYSTEM once, it blinks

4 When in Confirm mode, the TAKE button illuminates

5 Push in to terminate the SYNC line. Push out when the line extends to another unit

6 If the unit is not the first unit in the line, connects to the RS-232 OUT 9-PIN D SUB port of the previous unit in the line

7 The 88 Series RS-485 connector has 4 pins, and the Remote Controller RS-485 connector has just 3 pins

8 If the unit is the final unit in the daisy-chain connection, no termination is required

### 4.3 Your SD-7588A 8x8 Digital Audio Matrix Switcher

The **SD-7588A** is a high performance multi-standard 8x8 digital audio matrix switcher that is adjustment-free, cable-equalized and reclocking. In addition, the **SD-7588A**:

- Provides automatic equalization for losses on 110Ω twisted pair cable
- Reclocks each output to provide eight low-jitter digital outputs
- Supports AES/EBU, IEC 958, S/PDIF and EIAJ CP340/1201 professional and consumer formats with sampling frequencies up to 96kHz
- Comes with all inputs and outputs transformer coupled, supporting 110Ω impedance twisted pair cable on detachable terminal block connectors
- Is controllable via the front panel buttons as well as the built-in RS-232 and RS-485 interfaces
- Includes 15 preset memory locations for quickly and easily accessing the most frequently used configurations
- May be used with the **RC-8000**, an optional remote controller (see section 0)
- Functions as a standalone unit as well as part of a Kramer multi-signal switcher system<sup>1</sup>

Figure 3 and Table 3 define the **SD-7588A**:

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<sup>1</sup> Which includes digital and analog video, digital and analog audio and RS-422 control switchers. When integrated in a system, it switches together with the video during the vertical interval, thus supporting true IN SYSTEM mode

## Your Matrix Switchers

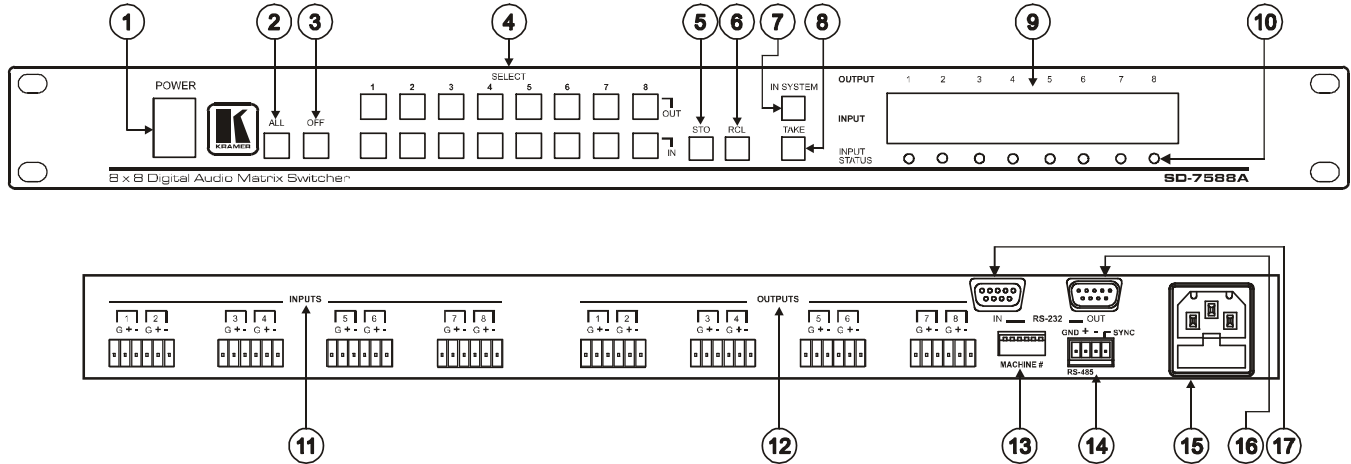


Figure 3: SD-7588A 8x8 Digital Audio Matrix Switcher

*Table 3: SD-7588A 8x8 Digital Audio Matrix Switcher Features*

#	Feature		Function
1	Power Switch		Illuminated switch supplying power to the unit
2	ALL Button (ALL= All Outputs)		Pressing ALL before pressing an INPUT button, connects that input to all outputs
3	OFF Button (OFF= All Inputs)		Pressing OFF after pressing an OUTPUT button disconnects that output from the inputs. To turn off the connections, press the ALL button and then the OFF button
4	SELECT Buttons	OUT	Select the output to which the input is switched
		IN	Select the input to switch to the output
5	STO Button		Pressing STO (STORE) followed by an output button stores the current setting (refer to section 8.2.1) <sup>2</sup>
6	RCL Button		Pressing the RCL (Recall) button and the corresponding OUT key recalls a setup. Press the RCL button again to implement the new status (refer to section 8.2.2)
7	IN SYSTEM Button		Pressing IN SYSTEM twice <sup>3</sup> , switches between the Standalone mode (in which the switcher implements any action independently from the others) and the In System mode (in which all switchers implement the same action simultaneously)
8	TAKE Button (TAKE = CONFIRM)		Pressing TAKE toggles the mode between the CONFIRM mode <sup>4</sup> and the AT ONCE mode (user confirmation per action is unnecessary)
9	OUTPUT labels		Identifies a connection between the output and the input shown below it
	INPUT Status Display		Displays the selected input switched to the output (marked above each input)
10	INPUT STATUS LEDs		Illuminate when the input signal is presented on a corresponding line and complies with the AES/EBU standard
11	INPUTS Connectors		Audio inputs
12	OUTPUTS Connectors		Audio outputs
13	MACHINE # Dipswitches		For setup of the machine number (refer to section 6.1)
14	RS-485 Connector		RS-485 detachable terminal block port. Pins # 1 to # 3 are for RS 485 and pin # 4 is for vertical sync distribution <sup>5</sup>
15	Power Connector with Fuse		AC connector enabling power supply to the unit
16	RS-232 OUT 9-pin D-sub Connector		Connects to the RS-232 IN 9-pin D-sub port of the next unit in the daisy-chain connection <sup>6</sup>
17	RS-232 IN 9-pin D-sub Connector		Connects to PC or Remote Controller <sup>7</sup>

1 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

2 For example, press STO and then the Output button # 3 to store in Setup # 3

3 After pressing IN SYSTEM once, it blinks

4 When in Confirm mode, the TAKE button illuminates

5 The 88 Series RS-485 connector has 4 pins, and the Remote Controller RS-485 connector has just 3 pins

6 If the unit is the final unit in the daisy-chain connection, no termination is required

7 If the unit is not the first unit in the line, connects to the RS-232 OUT 9-pin D-sub port of the previous unit in the line

## 4.4 Your SD-7588V 8x8 SDI Matrix Switcher

The **SD-7588V** is a high performance multi-standard 8x8 serial digital video matrix switcher that is adjustment-free, cable-equalized and reclocking. In addition, the **SD-7588V**:

- Provides automatic equalization for losses on 75Ω coaxial cable, and reclocks each output to provide eight low-jitter serial digital outputs
- Automatic standard recognition
- Operates with both 10-bit and 8-bit video, automatically recognizing the word length
- Accepts analog video as the external source for its vertical interval trigger
- Is controllable via the front panel buttons as well as the built-in RS-232 and RS-485 interfaces
- Includes 15 preset memory locations for quickly and easily accessing the most frequently used configurations
- May be used with the **RC-8000**, an optional remote controller (see section 0)
- Functions as a standalone unit as well as part of a Kramer multi-signal switcher system<sup>1</sup>

Figure 4 and Table 4 define the **SD-7588V**:

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<sup>1</sup> Which includes digital and analog video, digital and analog audio, and RS-422 control switchers. When integrated into a system, it provides the rest of switchers with the vertical interval trigger

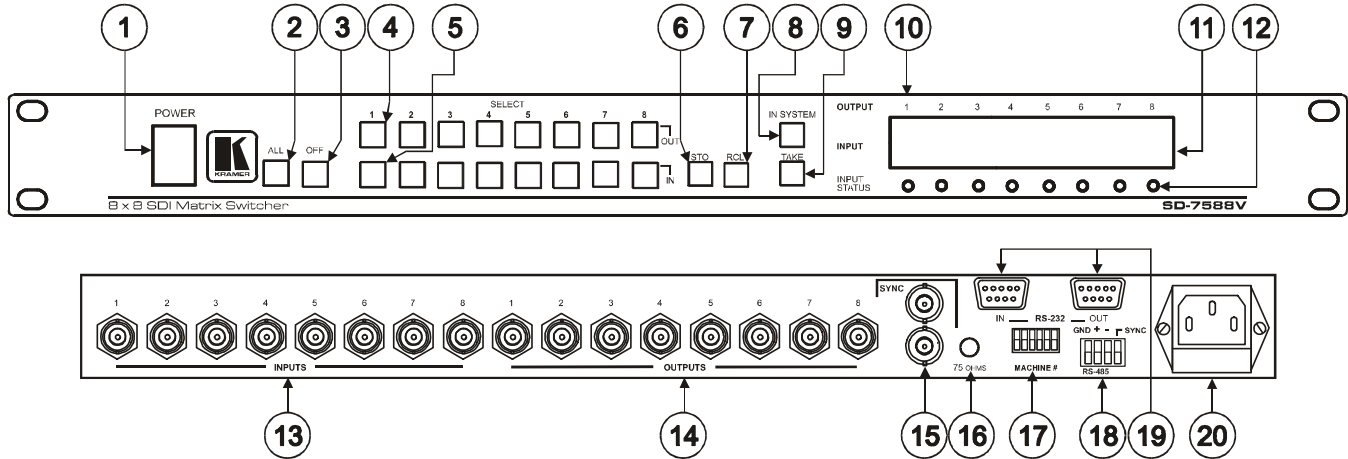


Figure 4: SD-7588V 8x8 SDI Matrix Switcher



Table 4 defines the features and functions of the **SD-7588V**:

*Table 4: SD-7588V 8x8 SDI Matrix Switcher Features*

#	Feature		Function
1	Power Switch		Illuminated switch supplying power to the unit
2	ALL Button (ALL= All Outputs)		Pressing <b>ALL</b> before pressing an <b>INPUT</b> button, connects that input to all outputs <sup>1</sup>
3	OFF Button (OFF= All Inputs)		Pressing <b>OFF</b> after pressing an <b>OUTPUT</b> button disconnects that output from the inputs. To turn off the connections, press the <b>ALL</b> button and then the <b>OFF</b> button
4	SELECT Buttons	OUT	Select the output to which the input is switched
5		IN	Select the input to switch to the output
6	STO Button		Pressing <b>STO</b> (STORE) followed by an output button stores the current setting (refer to section 8.2.1) <sup>2</sup>
7	RCL Button		Pressing the <b>RCL</b> (Recall) button and the corresponding OUT key recalls a setup. Press the <b>RCL</b> button again to implement the new status (refer to section 8.2.2)
8	IN SYSTEM Button		Pressing <b>IN SYSTEM</b> twice <sup>3</sup> , switches between the <i>Standalone</i> mode (in which the switcher implements any action independently from the others) and the <i>In System</i> mode (in which all switchers implement the same action simultaneously)
9	TAKE Button (TAKE = CONFIRM)		Pressing <b>TAKE</b> toggles the mode between the <b>CONFIRM</b> mode <sup>4</sup> and the <b>AT ONCE</b> mode (user confirmation per action is unnecessary)
10	OUTPUT Labels		Identifies a connection between the output and the input shown below it
11	INPUT Status Display		Displays the selected input switched to the output (marked above each input)
12	INPUT STATUS LEDs		Illuminate when the input signal is presented on a corresponding line and complies with the SDI standard
13	INPUT BNC Connectors		Connect to the composite video sources (from 1 to 8)
14	OUTPUT BNC Connectors		Connect to the composite video acceptors (from 1 to 8)
15	SYNC BNC Connectors		For looping to external video sync input
16	75 OHMS Button		Controls loop termination <sup>5</sup>
17	MACHINE #		Dipswitches for setup of the machine number (refer to section 6.1)
18	RS-485 Connector		RS-485 detachable terminal block port. Pins # 1 to # 3 are for RS 485 and pin # 4 is for vertical sync distribution <sup>6</sup>
19	RS-232 9-pin D-sub Connectors	IN	Connects to PC or Remote Controller <sup>7</sup>
		OUT	Connects to the RS-232 IN 9-pin D-sub port of the next unit in the daisy-chain connection <sup>8</sup>
20	Power Connector with Fuse		AC connector enabling power supply to the unit

1 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

2 For example, press STO and then the Output button # 3 to store in Setup # 3

3 After pressing IN SYSTEM once, it blinks

4 When in Confirm mode, the TAKE button illuminates

5 Push in to terminate the SYNC line. Push out when the line extends to another unit

6 The 88 Series RS-485 connector has 4 pins, and the Remote Controller RS-485 connector has just 3 pins

7 If the unit is not the first unit in the line, connects to the RS-232 OUT 9-pin D-sub port of the previous unit in the line

8 If the unit is the final unit in the daisy-chain connection, no termination is required

## 4.5 Your RC-8000 Remote Controller

The **RC-8000** is an optional remote controller for accessing and controlling switchers in the *88 Series*. In addition, the **RC-8000**:

- Supports<sup>1</sup> the creation of any configuration that consists of a PC, an unlimited number of remote controllers, and up to any<sup>2</sup> eight *88 Series* switchers, activating all the functions of the connected devices, individually or grouped
- Includes eight illuminated MACHINE IN SYSTEM buttons that enable toggling between the standalone and the IN SYSTEM modes of any switcher, and viewing the status and control of the corresponding switcher<sup>3</sup>
- Includes eight bright LED displays showing the status of any standalone or IN SYSTEM matrix switcher
- Continuously scrutinizes the status of the connecting RS-485 line
- Receives its power from a 12V DC source (also useful for field operation)
- Can be desktop-mounted (by resting it on its base or attaching it to the desktop) or built into a controlling table

Figure 5 illustrates the front and rear panels of the **RC-8000 Remote Controller**:

---

1 Using its built-in RS-485 interface

2 You can control different types of machines in a single configuration

3 That is, the switcher with the same MACHINE # as the MACHINE IN SYSTEM #

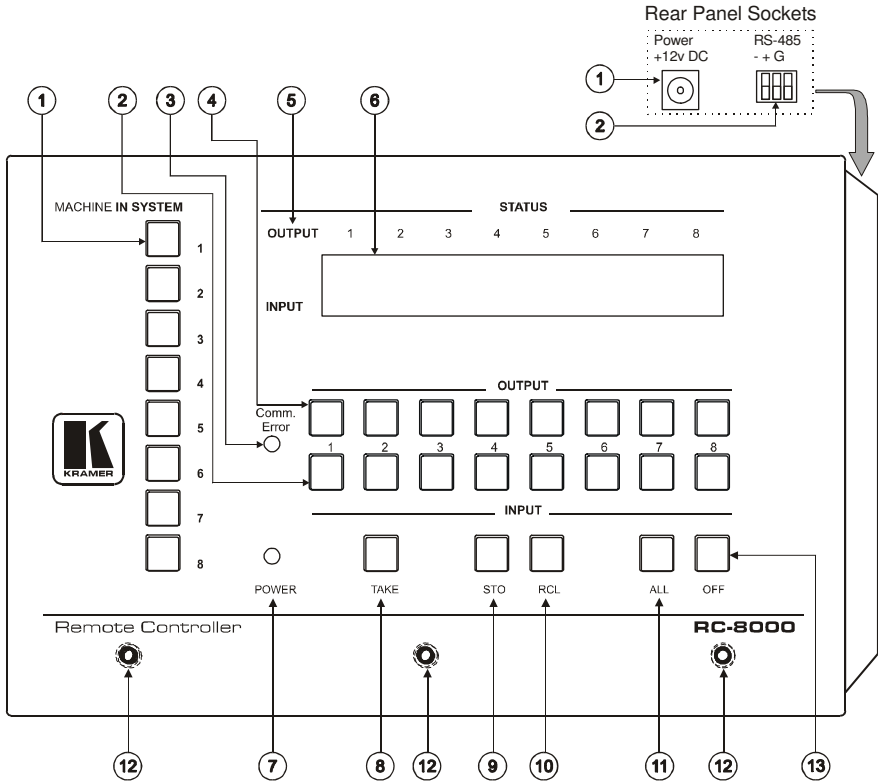


Figure 5: RC-8000 Remote Controller

Table 5 and Table 6 define the features and functions of the **RC-8000**:

*Table 5: RC-8000 Remote Controller Top Panel Features*

#	Feature		Function
1	MACHINE IN SYSTEM Buttons		Enable toggle between the standalone and the IN SYSTEM modes of any switcher, and viewing the status and control of the corresponding switcher <sup>1</sup> (from 1 to 8)
2	INPUT Buttons		Select the input to switch to the output (from 1 to 8)
3	Comm. Error LED		The Comm. Error red LED illuminates when a connection between the remote controller and a switcher fails <sup>2</sup>
4	OUTPUT Buttons		Select the output to which the input is switched (from 1 to 8)
5	STATUS	OUTPUT labels	Identifies a connection between the output and the input shown below it
6		INPUT Display	Displays the selected input switched to the output (marked above each input)
7	POWER LED (green)		Illuminates when power is activated
8	TAKE Button (TAKE = CONFIRM)		Pressing TAKE toggles the mode between the CONFIRM mode <sup>3</sup> and the AT ONCE mode (user confirmation per action is unnecessary)
9	STO Button		Pressing STO (STORE) followed by an output button stores the current setting (refer to section 8.2.1)
10	RCL Button		Pressing the RCL (Recall) button and the corresponding OUT key recalls a setup. Press the RCL button again to implement the new status (refer to section 8.2.2)
11	ALL Button (ALL= All Outputs)		Pressing ALL before pressing an INPUT button, connects that input to all outputs <sup>4</sup>
12	Three Screws		Removing the three screws separates the base platform. By drilling three holes in the desktop you can screw the remote controller directly in place
13	OFF Button (OFF= All Inputs)		Pressing OFF after pressing an OUTPUT button disconnects that output from the inputs. To turn off the connections, press the ALL button and then the OFF button

*Table 6: RC-8000 Remote Controller Rear Panel Features*

#	Feature	Function
1	<b>Power</b> Socket	+12V DC connector enabling power supply to the unit
2	<b>RS-485</b> Connector	RS-485 detachable terminal block port

<sup>1</sup> Refer to section 7

<sup>2</sup> For example, the switcher is not connected at all, or connected, but without power

<sup>3</sup> When in Confirm mode, the *TAKE* button illuminates

<sup>4</sup> For example, press *ALL*, and then *Input* button # 2 to connect that input to all outputs

## 5 Installing in a Rack

This section describes what to do before installing in a rack and how to rack mount.

### Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5° to +45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to 158° F)
Storage humidity range	5 to 95% RHL, non-condensing



### CAUTION!!

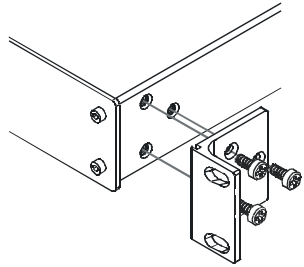
When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

### How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: <http://www.kramerelectronics.com>)

## 6 Connecting Your Matrix Switchers

This section describes how to:

- Set the dipswitches (refer to section 6.1)
- Connect a standalone unit (refer to section 6.2)
- Connect several units<sup>1</sup> with/without the remote controller (refer to section 6.3)
- Connect several units and the PC (refer to section 6.4)
- Connect a component switcher (refer to section 6.5)

### 6.1 Dipswitch Settings

Each 88 *Series* switcher includes a rear panel set of six dipswitches, as Figure 6, Table 7 and Table 8 define.

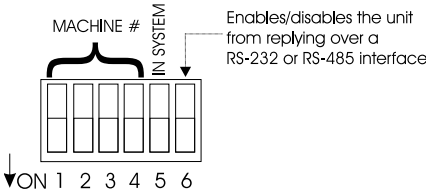


Figure 6: Rear Panel Dipswitches

Table 7: Rear Panel Dipswitches

Dipswitch #	Function:
1-4	Set the MACHINE NUMBER (refer to Table 8)
5	Disables use of the <i>IN SYSTEM</i> button (OFF = enables the <i>IN SYSTEM</i> button; ON = disables the <i>IN SYSTEM</i> button)
6	Enables a reply from the unit after it receives an RS-232 / RS-485 command (OFF = disables reply <sup>2</sup> ;ON = enables reply)

Table 8: Machine # Dipswitch Settings

MACHINE #	DIPSWITCH			
	1	2	3	4
1	OFF	ON	ON	ON
2	ON	OFF	ON	ON
3	OFF	OFF	ON	ON
4	ON	ON	OFF	ON
5	OFF	ON	OFF	ON
6	ON	OFF	OFF	ON
7	OFF	OFF	OFF	ON
8	ON	ON	ON	OFF

<sup>1</sup> With the 88 *Series*, you cannot connect two separate *IN SYSTEM* mode systems as one combined system

<sup>2</sup> Helpful, for example, when using three composite video switchers to form one component video switcher

## 6.2 Connecting a Standalone Unit

To connect a standalone unit:

- Connect the power supply
- Connect the audio and/or video input and output cables
- Connect the video reference input for **VS-88V** and/or **SD-7588V**
- Set dipswitch # 1 OFF and dipswitches # 2, 3, 4, 5 and 6 ON (see section 6.1)  
The IN SYSTEM button is non responsive

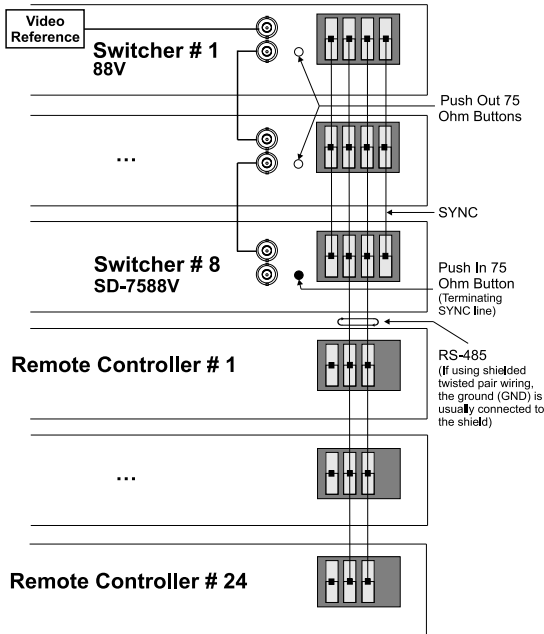
## 6.3 Connecting Several Units with/without the Remote Controller

To connect several units with or without the remote controller:

- Connect the power supply
- Connect the audio and/or video input and output cables
- Connect the video reference input for **VS-88V** or **SD-7588V**
- In a system with more than one video switcher (either **VS-88V** or **SD-7588V**), connect all video switchers to the video reference by looping between the sync BNC connectors
- Set the dipswitches for the different MACHINE # (1 to 8) for each machine and set dipswitch # 5 OFF and dipswitch # 6 ON
- Connect all the 4 terminals to the RS-485 interface connectors
- Operate the front panel controls of any switcher

Figure 7 illustrates a typical system connection:

## Connecting Your Matrix Switchers



*Figure 7: RS-485 System Connection: Switchers and Remote Controllers*

You can connect up to 24 remote controllers and up to 8 switchers per system. However, when connecting less than 8 switchers, you can connect more remote controllers<sup>1</sup>.

<sup>1</sup> RS-485 connection supports up to 32 devices, that is, switchers and remote controllers. For example, when connecting 2 switchers per system, you can connect up to 30 remote controllers



## 6.4 Connecting Several Units and the PC

To connect several units and the PC:

- Connect the power supply
- Connect the audio and/or video input and output cables
- Connect the video reference input (for video) for **VS-88V** and/or **SD-7588V**
- Set the dipswitches for the different MACHINE #. Set dipswitch # 5 OFF and dipswitch # 6 ON
- Switchers in a daisy chain arrangement<sup>1</sup> using the RS-232 IN and RS-232 OUT 9-pin D-sub connectors should be connected using a flat-cable, or with at least the three wires (pins # 2, # 3 and # 5)<sup>2</sup>. **Do not use a null-modem adapter.** Assign PC port to 9600, N, 8, and 1

Figure 8 illustrates a typical system connection with both<sup>3</sup> the RS-232 and the RS-485 connected in a parallel line:

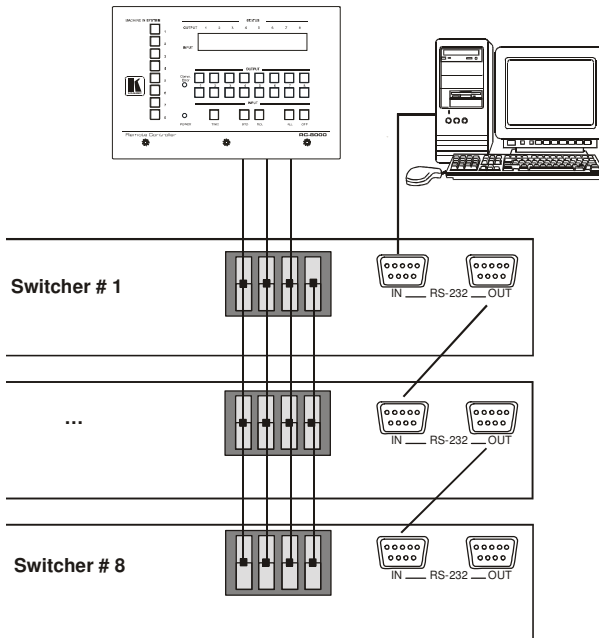


Figure 8: System Connection: Switchers and the PC

<sup>1</sup> The 88 Series firmware complies with Kramer Protocol-2000 (version 3.1 and higher)

<sup>2</sup> Make one-to-one connections (that is, uncrossed)

<sup>3</sup> Often the PC has no RS-485 Com port and so both are required simultaneously

## 6.5 Connecting a Component<sup>1</sup>, Y/C, RGBS or RGBHV Switcher

A component<sup>2</sup> switcher consists of three **VS-88V** switchers, interconnected as one group, with one of the switchers set as the Master. A component switcher can function in the IN SYSTEM or standalone mode. Similarly, you can configure two **VS-88V** switchers for Y/C (s-Video), four **VS-88V** switchers for RGBS or five **VS-88V** switchers for RGBHV.

To set the **VS-88V** switchers in the group to operate as a single component switcher, do the following with every switcher in the group:

- Set the same MACHINE # for each switcher (for example, MACHINE # 2)
- Set dipswitch # 5 OFF
- Set dipswitch # 6 OFF (**except on the Master, set Dipswitch # 6 ON**)  
Except for the Master (whose LEDs illuminate and front panel controls remain unlocked), the LEDs on all switchers in the group are dimmed, and their front panel controls are locked<sup>3</sup>

Figure 9 illustrates a component switcher that consists of a group of 3 **VS-88V** switchers:

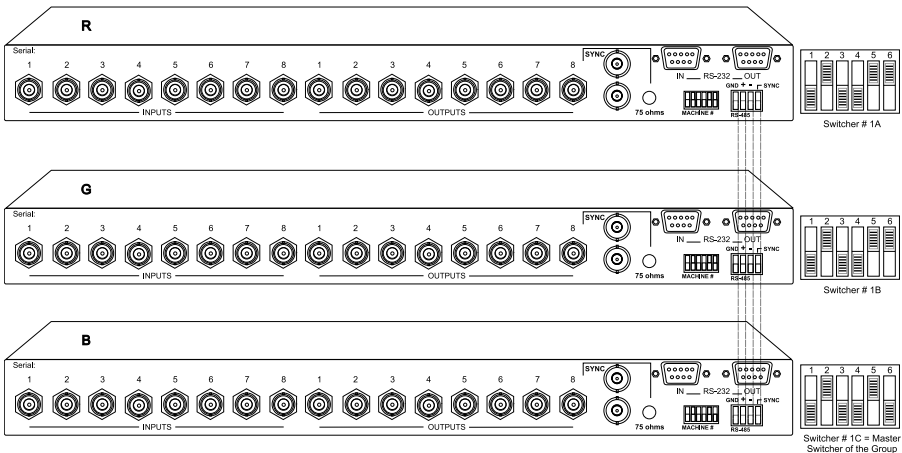


Figure 9: Component Switcher: VS-88V Group Connection

<sup>1</sup> For RGB or YUV (Y, B-Y, R-Y)

<sup>2</sup> Video signal in component form offers the highest professional video quality, superior to composite or s-Video

<sup>3</sup> After initially powering up the component switcher, if some of its switchers remain in a different status, press the ALL button followed by the OFF button on the Master to reset all the connections prior to normal operation

## 7 Understanding the Modes

This section describes the different system and confirmation modes.

### 7.1 About the System Modes

By default, a switcher starts in the standalone mode and the IN SYSTEM key does not illuminate. Pressing the IN SYSTEM key twice toggles to the IN SYSTEM mode.

This section describes the Standalone and the IN SYSTEM modes, as follows:

#### 7.1.1 Standalone Mode

In the standalone mode:

- The switcher implements actions independently and separately from the others
- Upon starting the system, only one MACHINE IN SYSTEM # illuminates on the remote controller

#### 7.1.2 IN SYSTEM Mode

In the IN SYSTEM mode:

- Several switchers with different kinds of signals are connected as a system operating as a universal switcher<sup>1</sup>
- More than one MACHINE IN SYSTEM # illuminates<sup>2</sup> to indicate the units that are connected as part of a system. Each MACHINE IN SYSTEM # for those IN SYSTEM units will not illuminate. However, on each of the IN SYSTEM units, the respective IN SYSTEM button continues to illuminate
- Any executed action affects all units in the system

### 7.2 About the Confirmation Modes

By default, the unit starts in the *AT ONCE* mode, that is, if an *OUT-IN* combination is pressed, it will be implemented immediately. Pressing the TAKE button twice, toggles between the CONFIRM and the AT ONCE modes.

This section describes the CONFIRM and the AT ONCE modes, as follows:

---

<sup>1</sup> Each switches in the same order according to the entered command, with one or more of them following the other units

<sup>2</sup> The IN SYSTEM button on each unit also illuminates

### **7.2.1 AT ONCE Mode**

In the AT ONCE mode:

- You save time
- Actions require no user confirmation
- Execution is immediate
- No protection is offered to prevent the implementation of a wrongly entered action

### **7.2.2 CONFIRM Mode**

In the CONFIRM mode:

- You have a method to help avoid making a mistake
- Every action requires user confirmation
- Execution is delayed until the user confirms the action
- Protection is offered to prevent erroneous switching

## 8 Operation

This section describes the hardware of the machine and the operation of its front panel controls.

For instructions on using the Windows®-based Kramer control software, refer to the separate user manual<sup>1</sup>, *Kramer Control Software*.

### 8.1 Technical Information

This section describes setup capacity, switching the power on, timeout and the system settings.

#### 8.1.1 Setup Capacity

From every switcher you can store up to 8 setups. From the PC you can store up to 15 setups.

#### 8.1.2 Switching the Power On

To switch the power on at all the switchers, do the following:

1. Verify, via the automatic self-test, that all switchers function correctly.
2. Check the firmware version number indicated by the two fast blinking digits on the display<sup>2</sup>.

To switch the power on at the remote controller, do the following:

1. Attach the power adapter plug to the power socket on the remote controller.
2. Verify, via the automatic self-test, that all switchers and the remote controller function correctly.
3. The Comm. Error LED will illuminate to indicate a problem<sup>3</sup>, if at all, with any switcher.

#### 8.1.3 Timeout

By design, every push button operation is subject to a 30 second timeout. Failure to fully execute an action within 30 seconds will necessitate restarting that action whilst the LED display will show the previous state.

---

<sup>1</sup> Included on the CD-ROM in .pdf format

<sup>2</sup> For example, the digits 10 indicate version 1.0

<sup>3</sup> For example, if a switcher is not connected, or its power is switched off

### 8.1.4 System Settings Priority

The design excludes any priority<sup>1</sup>. Any operator<sup>2</sup> can always override the previous system settings. For example, in Figure 7: RS-485 System Connection: Switchers and Remote Controllers, the system setting implemented by the operator of *Remote Controller # 24* will be the current system setting until the operator of say, *Remote Controller # 5*, implements a different system setting.

## 8.2 Push Button Controls

This section describes how to store, recall and lock/unlock settings.

### 8.2.1 Storing a Setting

To store a setting, do the following:

1. Press the STO button. The STO button blinks.
2. Press the Output #. The LED Output display # blinks<sup>3</sup>.
3. Press the STO button again. The memory stores the data.
4. The LED display returns to its previous state<sup>4</sup>.

### 8.2.2 Recalling a Setting

To recall a setting, do the following:

1. Press the RCL button. The RCL button blinks.
2. Press the Output #. The LED Output display # blinks<sup>5</sup>, displaying what was previously stored.
3. Press the RCL button again. This recalls the stored data.

By design<sup>6</sup>, you cannot recall data that is stored in a particular unit from a different unit. Each unit, even when set to the IN SYSTEM mode, stores its own data separately.

---

1 Between any or all of the following: remote controllers, front panel controls and a PC

2 Whether he operates a remote controller, a set of front panel controls or a PC

3 At this stage, pressing a different # changes the Output #

4 Nothing changes in the setup

5 At this stage, pressing a different # changes the Output #

6 On one occasion the same unit can function in the standalone mode, and on another occasion in the IN SYSTEM mode

### 8.2.3 Locking and Unlocking Settings

The remote controllers and the PC include a flexible locking<sup>1</sup> mechanism for safeguarding settings on switchers. To prevent changing the settings accidentally<sup>2</sup>, lock your switchers. Unlocking releases<sup>3</sup> the protection mechanism.

From any remote controller you can lock and unlock the following<sup>4</sup>:

- A specific switcher
- All switchers
- That specific remote controller

From the PC<sup>5</sup> you can lock and unlock the following:

- A specific switcher
- All switchers

Locking a specific remote controller does not lock any other remote controller. To lock all the remote controllers, press the TAKE and the STO push buttons on each remote controller separately. You cannot simultaneously lock or unlock all the remote controllers from one remote controller, or from the PC. When all switchers and remote controllers are locked, the front panel switcher push buttons are inoperative. By design, only specific<sup>6</sup> remote controller push buttons will function, enabling the operator to execute the unlock commands.

Section 8.2.3.1 describes how to lock the switcher and section 8.2.3.2 describes how to unlock the switcher. For a concise summary of the locking/unlocking push button sequence, refer to Table 9 on page 30.

---

1 Locking means that the front panel is locked. In all other respects (for example, recall, changing input and output), the switcher still operates via the remote controller and the PC

2 Especially if the system is complex and the switchers are stored on a rack in another room

3 Restarting (perhaps due to an electricity failure) a switcher or a remote controller also releases the protection mechanism (without wiping out the switcher settings)

4 You cannot lock/unlock from a switcher

5 You cannot lock a PC

6 That is, TAKE, RCL, and ALL

### 8.2.3.1 Locking Switchers

To lock a specific switcher, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the appropriate MACHINE IN SYSTEM # button on the remote controller. The MACHINE IN SYSTEM # button blinks.
3. Press the STO button on the remote controller. The specific switcher locks and the INPUT STATUS Display numbers on the switcher appear dimmed.

To lock all switchers, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the ALL button on the remote controller. The ALL button blinks.
3. Press the STO button on the remote controller. All the units lock and the INPUT STATUS Display numbers on the switchers appear dimmed.

To lock a remote controller, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the STO button on the remote controller. The remote controller locks and the INPUT STATUS Display numbers on the remote controller appear dimmed<sup>1</sup>.

### 8.2.3.2 Unlocking Switchers

To unlock a specific switcher, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the appropriate MACHINE IN SYSTEM # button on the remote controller. The MACHINE IN SYSTEM # button blinks.
3. Press the RCL button on the remote controller. The specific locked switcher unlocks and the INPUT STATUS Display numbers on the switcher no longer appear dimmed.

---

<sup>1</sup> All other remote controllers remain unlocked



To unlock all switchers<sup>1</sup>, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the ALL button on the remote controller. The ALL button blinks.
3. Press the RCL button on the remote controller. All the switchers unlock and the INPUT STATUS Display numbers on the switchers no longer appear dimmed. The remote controller also unlocks.

To unlock a remote controller, do the following:

1. Press the TAKE button on the remote controller. The TAKE button blinks.
2. Press the RCL button on the remote controller. The locked remote controller unlocks and the INPUT STATUS Display numbers on the remote controller no longer appear dimmed<sup>2</sup>.

*Table 9: Push Button Sequence Summary*

	Lock	Unlock
<b>Specific Switcher</b>	TAKE + MACHINE IN SYSTEM # + STO	TAKE + MACHINE IN SYSTEM # + RCL
<b>All Switchers</b>	TAKE + ALL + STO	TAKE + ALL + RCL <sup>3</sup>
<b>Remote Controller</b>	TAKE + STO	TAKE + RCL

## 9 Technical Specifications

Table 10 lists the technical specifications for the 88 *Series* switchers.

<sup>1</sup> Including the remote controller, if locked

<sup>2</sup> All other remote controllers remain locked. You will need to unlock each remote controller separately

<sup>3</sup> Unlocks all units, and in addition, the remote controller

## Technical Specifications

*Table 10: Technical Specifications for 88 Series*

	VS-88A	VS-88V	SD-7588A	SD-7588V
INPUTS:	8 balanced stereo audio, +4 dBm/33k $\Omega$ on detachable terminal blocks	8 composite video, 1Vpp/75 $\Omega$ on BNCs, looping Analog sync inputs 1Vpp/75 $\Omega$ on BNCs	8 AES/EBU digital audio, 110 $\Omega$ on detachable terminal blocks, transformer coupled	8 x SMPTE - 259M serial video, 75 $\Omega$ on BNCs; looping Analog sync inputs on BNCs
OUTPUTS:	8 balanced audio stereo, +4 dBm/50 $\Omega$ Vpp max) on detachable terminal blocks	8 composite video, 1Vpp/75 $\Omega$ on BNCs	8 reclocked AES/EBU digital audio, 110 $\Omega$ on detachable terminal blocks, transformer coupled	8 reclocked SMPTE-259M outputs, 75 $\Omega$ on BNCs
SAMPLING:			32, 44.1, 48, 96 kHz sampling frequencies	
RESOLUTION:			Up to 24-bit, automatic according to input resolution	10-bit or 8-bit, automatic according to input resolution
STANDARDS:			AES/EBU, IEC 958, S/PDIF and EIAJ CP340/1201	4fsc PAL, 4fsc NTSC, 4:2:2 (525/625), and 360Mb/s wide screen (525/625)
VIDEO BANDWIDTH:			200 MHz 3dB	
VIDEO CROSSTALK:			< -50 dB @ 5 MHz	
VIDEO S/N:			>74 dB	
DIFF. GAIN:			<0.05%	
DIFF. PHASE:			<0.03 Deg	
K-FACTOR:			< 0.05%	
AUDIO BANDWIDTH:	> 40 kHz; 0.3db			
AUDIO CROSSTALK:	< - 90 dB			
AUDIO S/N:	> 90 dB unweighted (1Vpp)			
AUDIO THD:	< 0.02% (1Vpp, 1kHz)			
MAXIMAL AUDIO	20 dBm			
EQUALIZATION:				
			Automatic up to 200mV eye pattern	Automatic for up to 300m for 270 Mb/s using Belden 8281 cable
DISPLAY:	Current switcher status on eight 7-segment bright LEDs		Current switcher status on eight 7-segment bright LEDs. Signal presence for each channel on front panel LEDs	
CONTROLS:	22 front-panel touch switches, RS-232 and RS-485 control interface			

	VS-88A	VS-88V	SD-7588A	SD-7588V
<b>SWITCHING:</b>	During vertical interval from Analog sync			
<b>DIMENSIONS:</b>	19-inch (W) x 7-inch (D) x 1U (H), rack mountable			
<b>POWER SOURCE:</b>	AC-110V/60Hz, 220V/50Hz (switchable inside the unit)			Universal, 85-264 VAC, 47-440 Hz, 25 VA max
<b>WEIGHT:</b>	3.5 kg. (7.8 lbs.) approx.			
<b>ACCESSORIES:</b>	Power cord, Windows 95/98/NT™ control software			

	RC-8000
<b>INPUTS/OUTPUTS:</b>	1x RS-485 connector on detachable terminal blocks
<b>CONTROLS:</b>	8 illuminated pushbuttons each assigned to a different controlled unit address. 8 out / 8 in / 5 operational pushbuttons similar to the <i>88 Series</i>
<b>DIMENSIONS:</b>	8.5-inch (W) x 1.5-inch (D) x 5.5-inch (H), (21.6 cm x 3.8 cm x 14 cm)
<b>POWER SOURCE:</b>	12V DC, 200 mA
<b>WEIGHT:</b>	0.4 kg (0.9 lbs.) approx.
<b>ACCESSORIES:</b>	Wall Power supply

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## LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

### HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

### WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

### WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site [www.kramerelectronics.com](http://www.kramerelectronics.com).
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
  - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
  - ii) Product modification, or failure to follow instructions supplied with the product
  - iii) Repair or attempted repair by anyone not authorized by Kramer
  - iv) Any shipment of the product (claims must be presented to the carrier)
  - v) Removal or installation of the product
  - vi) Any other cause, which does not relate to a product defect
  - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

### WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

### HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on your product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

### LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

### EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

**NOTE:** All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

- EN-50081: "Electromagnetic compatibility (EMC);  
generic emission standard.  
Part 1: Residential, commercial and light industry"
- EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard.  
Part 1: Residential, commercial and light industry environment".
- CFR-47: FCC Rules and Regulations:  
Part 15: "Radio frequency devices  
Subpart B Unintentional radiators"

### CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.



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**For the latest information on our products and a list of Kramer distributors, visit our Web site: [www.kramerelectronics.com](http://www.kramerelectronics.com), where updates to this user manual may be found. We welcome your questions, comments and feedback.**



**Caution**

**Safety Warning:**

Disconnect the unit from the power supply before opening/servicing.



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**Kramer Electronics, Ltd.**

Web site: [www.kramerelectronics.com](http://www.kramerelectronics.com)

E-mail: [info@kramerel.com](mailto:info@kramerel.com)

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